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XXII. *An Account of a new and cheap Method of preparing Pot-ash, with Observations.* By Thomas Percival, M. D. F. R. and A. S. Member of the Royal Society of Physicians at Paris, &c.

Read April 6, 1780.

THE agriculture society at Manchester has long recommended the making of reservoirs for the water which flows from dung-hills in farm yards. This water is strongly impregnated with the salts and putrid matter of the dung-hill, and by stagnation it acquires a much higher degree of putrescence, and probably becomes proportionably more replete with salts. When thus collected and improved, it is pumped into an hog-head, which being drawn upon a sledge, or small cart, is conveyed into the meadows, for the purpose of sprinkling them with this rich manure. This important improvement in rural oeconomy, I apprehend, has not been extended much beyond the district of our society; and it seems to be unknown to one of the latest and most intelligent writers on husbandry: for Lord KAIMS, in a recent

cent work on this subject, of which he has favoured me with a copy, has not even mentioned it.

But these reservoirs may be applied to a purpose still more subservient to public utility than that above described. JOSIAH BIRCH, Esq. a gentleman who carries on an extensive manufactory, and bleaches his own yarn, about six months ago, was induced, by a happy turn of thought, to try whether the dung-hill water might not be converted into pot-ashes. He accordingly evaporated a large quantity of it, and burnt the *residuum* in an oven; the product of which so perfectly answered his expectations, that he has ever since continued to prepare these ashes, and to employ them in the operations of bucking. A stranger to that narrowness of spirit which seeks the concealment of a lucrative discovery, he is desirous that it should be communicated to the Royal Society, and has furnished me with the following account, together with the plan annexed.

“ The quantity of muck water used was twenty-four  
“ wine pipes full, which employed a man and two  
“ horses two days, to cart it from the pump to the pan  
“ wherein it was boiled; but this expence I shall now  
“ save, as I shall lay a sough of brick, which will convey  
“ it from the pump to the boiler. The coals used to  
“ boil and burn it were one hundred and twenty baskets,

“ and I suppose each basket weighs six score pounds or “ upwards. One man was occupied three weeks in boil-“ ing and burning. The quantity of ashes made was “ 9 cwt. 1 qr. 12 lbs. well worth, at the present price of “ ashes here, two guineas *per hundred*.

	L. s. d.
“ 9 cwt. 1 qr. 12 lb. at 42s. <i>per cwt.</i>	19 13 0
“ A man and two horses, two } “ days, at 6s. <i>per day</i> , - - - } 0 12 0	
“ 120 baskets of coals, at 5d. } “ <i>per basket</i> , - - - } 2 10 0	
“ A man’s wages for three weeks, 1 7 0	
	<hr/>
	4 9 0
	<hr/>
	15 4 0

“ The profit, therefore, amounts to 15l. 4s. deduct-“ ing only a trifle for the wear of the pan and oven.”

The profits arising from this preparation of pot-ash are sufficiently evinced by the foregoing estimate; and they may, perhaps, admit of increase by future improvements. In the spring and summer seasons, I should apprehend, the evaporation might be carried on without the aid of fire, by conveying the dung-hill water from the reservoir through proper sluices into shallow troughs or ponds, of such extent as to afford a sufficient

surface for the action of the sun and wind<sup>(a)</sup>. These might be covered in rainy weather with awnings of canvas, painted on the outside black, and white on the inside; the former with a view to absorb, the latter to reflect, the rays of light.

(a) The following abridged view of a meteorological register, which I kept with great exactness during the years 1774 and 1775, may throw some light on the practicability of this plan in the climate of Lancashire, which, I believe, is nearly the same as that of most of the other Western counties of England.

1774	Thermometer		Days	
	2 o'clock.	P.M.	Rainy	Fair.
Jan. Feb. March,	56	28	25	65
April, May, June,	72	45	55	36
July, August, Sept.	75	53	66	26
Oct. Nov. Dec.	60	30	43	49
<hr/>				
1775				
Jan. Feb. March,	54	30	61	29
April, May, June,	78	51	42	49
July, August, Sept.	74	48	62	30
Oct. Nov. Dec.	64	32	50*	28*

\* Fourteen days omitted, no account being taken.

The thermometer, used in making the preceding observations, was graduated according to the scale of FAHRENHEIT. It was placed in the open air, and in a Northern exposure. The column of rainy days expresses the least as well as the greatest quantity of rain. The column of fair days includes only those days in which not a single shower was noticed. The day comprehends twenty-four hours.

The mean quantity of rain which annually falls here is about 33 inches.

This

This pot-ash is of a greyish white appearance, deliquesces a little in moist air; but if kept in a dry room, near the fire, acquires a powdery surface. It is hard, and of a spongy texture when broken, with many small crystals in its substance. The colour of its internal parts is dusky and variegated. To the taste it is acrid, saline, and sulphureous. It emits no smell of volatile alkali, either in a solid form, dissolved, or when added to lime-water; neither does it communicate the sapphire colour to a solution of blue vitriol. Silver is quickly tinged black by it, a proof that it contains much phlogiston. Ten grains of this pot-ash required eleven drops of the weak spirit of vitriol to saturate them. The like quantity of salt of tartar required, of the same acid, twenty-four drops: a strong effervescence occurred in both mixtures; from the former a sulphureous vapour was exhaled. A tea spoonful of the syrup of violets, diluted with an ounce of water, was changed into a bright green colour by five grains of the salt of tartar; but ten grains of this pot-ash were necessary to produce the same hue, in a similar mixture. Half an ounce of the pot-ash dissolved intirely in half a pint of hot water; but when the liquor was cold, a large purple sediment subsided to the bottom: and it was found, that this sediment amounted to about two-thirds of the whole quantity of ashes used.

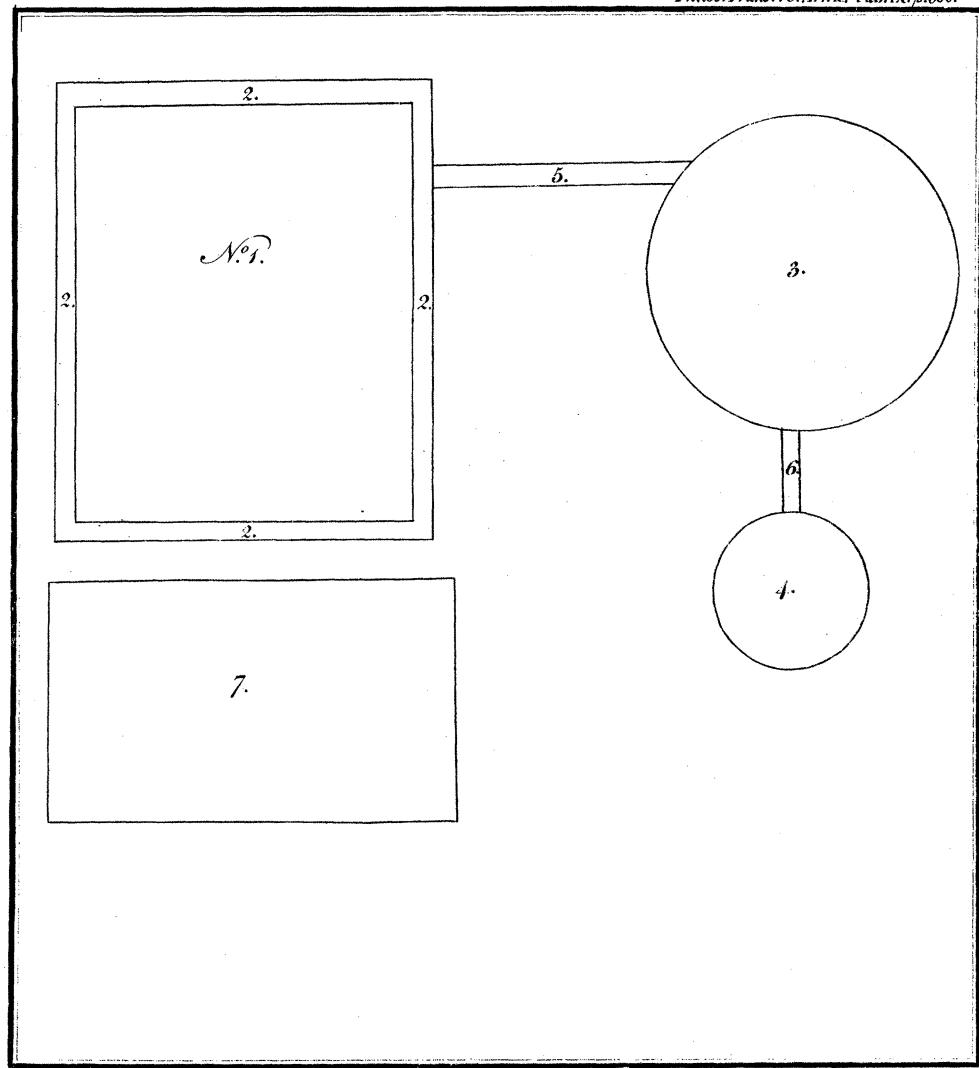
I have not leisure, at present, to prosecute these experiments farther, and shall therefore content myself with making a few general observations on the facts that have been advanced.

1. This pot-ash is a true fixed vegetable alkali, and a product of putrefaction which has not, that I recollect, been noticed by the chymists. A very celebrated writer has even in express terms asserted, that "all vegetables, "not excepting those which in their natural state furnish ashes containing much fixed alkali, when burnt, "after their acid has been altered by a complete putrefaction, leave ashes intirely free from alkali<sup>(b)</sup>".

2. The quantity of alkali contained in this pot-ash may, with some probability, be estimated at one-third of its weight; whereas the white Muscovy ashes are said to yield only one-eighth part<sup>(c)</sup>. Of its impurities sulphur is the most injurious to its bleaching powers, and should in the preparation of it be carefully separated. A longer continued and more gentle calcination in a furnace supplied with a sufficient current of air might, perhaps, answer this end. But the most effectual method would be to lixiviate the salts with pure water, after a moderate fusion, and then to evaporate them slowly to dryness.

(b) MACQUER's Dictionary of Chemistry, article Alkali.

(c) HOME on Bleaching, p. 157.



It must, however, be remarked, that in thus freeing the pot-ash from phlogistic matter, another impurity is generated: for both the action of fire, and the solution in water, convert into earth a portion of the alkaline salt.

3. No quick-lime appears to be contained in this pot-ash: for a solution of it, poured from its sediment, remained clear, though long exposed to the air. Nor did it acquire any milkiness by being blown into from the lungs; but perhaps the addition of this caustic substance would increase its activity and value, when employed in soap-boiling and other arts: for the Russian pot-ash is more pungent to the taste, saturates a larger proportion of acid, and dissolves oils more powerfully than the pure alkaline salts. And Dr. HOME has proved<sup>(d)</sup>, that these qualities depend on a large admixture of quick-lime.

4. It would be worthy of trial, to ascertain whether the large purple sediment, which subsides when this pot-ash is lixiviated, might not be applied to the manufacture of Prussian blue; or used in the manner recommended by Mr. MACQUER for dyeing wool and silk. See the Mémoirs of the French Academy for the year 1749<sup>(e)</sup>.

5. The farmer, though he live at a distance from the manufactures in which pot-ash is employed, may yet

(d) *Essay on Bleaching.* NEUMANN's Chemistry, by LEWIS.

(e) See also NEUMAN's Chemistry, by LEWIS, p. 73.

find his account in preparing it from dung-hill water: for it will furnish him with a top dressing for his garden and land, of great fertilizing powers. But if fuel be dear where he resides, and conveniences for combustion be wanting, the simple evaporation of the water may suffice, and the putrid lye, thus reduced to a solid form, will prove to be a rich manure. At Hart Hill, my summer abode, about three miles from Manchester, I have lately practised a method of making a compost of the dung-hill water. The weeds and rakings of the garden, the dressings of the fields, the leaves blown from the trees, and other refuse matters, are put together near the reservoir, out of which the water is occasioally pumped and scattered over the heap: so strong a ferment almost instantly excites putrefaction. And these vegetable substances are soon converted into a fertile mould, which retaining the salts and oils of the dung-hill water, suffers the superfluous moisture to exhale into the air, or to percolate through it. And I have found, by experience, that the compost thus prepared is laid on the meadows at less expence, and that it is more efficacious and durable in its operation than the sprinklings, which, at stated times, they formerly received: for my land, though good and in fine condition, is light and sandy,

sandy, and the dung-hill water quickly passed below the roots of the vegetables which grow upon its surface.

Manchester, March 3, 1780.

E X P L A N A T I O N O F T H E F I G U R E.

1. The dung-hill.
2. A sough or drain round the dung-hill.
3. A reservoir for the dung-hill water.
4. A well, communicating with the reservoir, in which a pump is fixed, to convey it to N° 7.
7. A pan in which the water is boiled to the consistence of treacle, and afterwards burnt in an oven. The pan is made of iron plates, turned up a little at the edges. To these are screwed planks of wood, to make it about twenty inches deep.

